

# Creating a Bank of Plant-Based Research-Project Templates for Final Year Students, School of Biological Science

## Context

Undergraduates taking Biomedical, Plant Science and Pharmacy degree programmes culminate in final-year projects where they demonstrate and put into practice the research skills they have accumulated during their degree programme.

However, there are challenges here each year for both students and staff. Where there are large numbers of students, provision of projects has become a pinch-point: finding suitable projects and time for their supervision can be perceived as a burden to some academic staff, especially where projects are unevenly distributed. In addition, students doing projects that are not thoroughly thought through and are unsuitable or ill-conceived can waste significant resources (money on chemicals, time on expensive equipment, technical support).

## Aim

This project aimed to develop a bank of plant-based project ideas that would appeal also to non-botany students. The project needed to be well-supported logistically (eg laboratory facilities and technical assistance), and help spread the supervisory responsibility more equally amongst staff.

A further aim was to realise the potential that the Harris garden and Herbarium offer but which are currently under-utilised outside Plant Sciences.

## Resources and Processes

The project was managed by a project officer and PI. and ran from October 07 to April 08.

Historical data on the provision of plant-based research projects, and the spread of projects across staff were collected for the previous two years.

Plant resources within the School of Biological Sciences were identified, and a database of plant species with medicinal and other (eg insecticidal) properties was constructed, identifying which species were already established in the Harris garden.

A project template was developed. Potential research areas within SBS, the School of Chemistry, Food Biosciences and Pharmacy, the School of Agriculture, Policy & Development, and the School of Human & Environmental Sciences were identified, developed and project descriptions written.

A Blackboard site to support the SBS project module was developed and web pages for the SBS website were designed to promote plant-based projects.

## Results

In the year prior to this project, 9 plant-based projects were on offer to non-botany students. Out of 117 students, 7 chose a plant-based project. For this coming academic year, 37 plant-based projects will be on offer, of which 23 were developed as part of this project.

Of the project templates developed, 38 use plant resources in the Harris garden, experimental grounds and glasshouses, and another 8 use preserved specimens in the Herbarium, thus using the whole school resources and ensuring the supervision workload is more evenly distributed amongst staff.

## Sustainability

Projects were designed to be repeatable from year to year with slight modifications (eg using different species). The templates also identify potential developments for future projects, and it is likely that projects will generate new lines of research. All of these should ensure that this initiative is self-sustaining.

## Further information

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## Appendix I

### Example project template

HGP CETL-AURS Project



## Plant-based project templates for Part 3 students

**Project proposed by:**

**Tel.:**

**E-mail address:**

**Project title:** The search for novel compounds to treat antibiotic-resistant Gram positive pathogenic bacteria

**Academic supervisor(s):**

**Assistance from postgrad/postdocs:**

**Project description (max 150 words):**

- **Objective/hypothesis**

The rise in widespread infections caused by antibiotic-resistant bacteria, such as methicillin-resistant *Staphylococcus aureus* (MRSA), has increased the need for novel sources of antimicrobial compounds. Many plant species are known to contain antimicrobial compounds (Cowan, 1999), some of which have a synergistic action when combined with compounds from other plant species (Abu-Shanab, 2004). This project aims to screen a selection of plant-derived compounds for antimicrobial activity in the search for new sources of antibiotics.

- **Methodology**

Crude plant extracts will be prepared using various solvents (water, ethanol, methanol) and assayed for antimicrobial activity in solid and liquid media. The antimicrobial effects of single-species and multiple-species plant extracts will be tested and inhibition zones and minimum inhibitory concentrations determined. If time allows, the active compounds from the crude plant extracts will be isolated using chromatographical methods.

- **Expected outcomes**

Identification of plant species with potential for development of novel antimicrobial compounds.

HGP CETL-AURS Project



**References:**

Cowan, M.M. (1999) Plant products as antimicrobial agents. *Clinical Microbiology Reviews* Vol. 12(4): 564-582

Abu-Shanab, B. et al (2004) Antibacterial activities of some plant extracts utilised in popular medicine in Palestine. *Turkish Journal of Biology* Vol. 28(2/4): 99-102

**No. of students:** 1

**Degree programme(s) for which project is suitable:** Microbiology, Botany, Biological Sciences.

**Pre-requisites/skill levels required (e.g. technically difficult/moderate/easy, intellectually difficult/moderate/easy):** Technically moderate, intellectually easy.

**Teaching and learning outcomes (e.g. will learn method of quantifying platelet aggregation):** Will learn how to isolate compounds from plant material and assay antimicrobial activity.

**Resources required (e.g. plant species, glasshouse space):** Facilities for growth of appropriate plants, facilities for isolation of compounds from plants, general microbiological facilities.

**Technical assistance provided by:**

**Estimated cost:**

- £50 ☐ £100 ☐ £150 ☐ £200 ☒ £250 (special cases) ☐

**Health and safety information:** This project involves the use of Category 2 pathogenic bacteria.

**Potential developments for future projects (e.g. alternative species):** Provide preliminary data which could be used for future projects.

Please return completed templates to Jo Smith via e-mail or internal post.